

## Health and the household

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**Abstract** We underscore the close link between the economics of the household and health economics in a framework in which consumers produce their fundamental objects of choice. Health is produced with inputs of market goods and services and the own time of the consumer. Health is demanded not only because it is an argument in the utility function but also because it determines the amount of time available for market and nonmarket production. The latter motive points to health capital as one component of the stock of human capital. The economics of the household has much to say about the determinants of investment in this type of capital. The five health economics papers in this issue of *Review of Economics of the Household* are connected by an emphasis on the role of time in the production of two aspects of health: obesity and the general health of elderly persons.

**Keywords** Health economics · Household production

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If the first issue of the *Review of Economics of the Household (REH)* had appeared in the 1950s or early 1960s instead of in 2003, it would have been strange to find a number of papers in health economics in the first six volumes and even stranger to find a special issue devoted to that topic in the seventh volume. Fifty or sixty years ago, health economics was in its infancy; health was viewed as dependent on medical care; and medical care was produced in the market rather than in the household. Indeed, it would have been anomalous to find a journal devoted to the economics of the household in that period. Households were viewed in a passive manner by economists. They simply purchased goods and services in the market to maximize a utility function subject to an income or wealth constraint. The production of these goods and services was relegated to firms in the market sector.

Becker (1964, 1965, 1991) and Mincer (1962, 1963, 1974) changed all that. Becker introduced the idea that consumers produce their fundamental objects of choice, called commodities, in the nonmarket or household sector, using inputs of market goods and services and their own time. Mincer emphasized that the distinction between work and leisure, used at the time to study labor supply decisions, was much too simple. Instead, this decision is complicated by the presence of many other uses of time. Both Becker and Mincer stressed that individuals allocate time to many activities including food preparation, child care, other types of production of goods and services for the home and the family, the acquisition of knowledge and skills or human capital via formal schooling and on-the-job training, and the search for a mate. These insights spawned what has been termed the “new home economics,” with an emphasis on such topics as optimal investment in human capital, models of optimal family size and child quality, and the marriage market. Shoshana Grossbard, the founding editor of *REH* has made important contributions to this literature (for example, Grossbard-Shechtman 1984, 1995), and her view that the academic community could be well serviced by a journal that focuses on the economics of the household has proven to be correct.

What has all of this to do with health economics? In the early 1970s, one of us (Grossman 1972a, b), used a number of insights from the new home economics to develop a theoretical and empirical investigation of the demand for the commodity “good health.” This work was motivated by the fundamental difference between health as an output and medical care as one of a number of inputs into the production of health and by the equally important difference between health capital and other forms of human capital. According to traditional demand theory, each consumer has a utility or preference function that allows him or her to rank alternative combinations of goods and services purchased in the market. Consumers are assumed to select that combination that maximizes their utility function subject to an income or resource constraint: namely, outlays on goods and services cannot exceed income. While this theory provides a satisfactory explanation of the demand for many goods and services, students of medical economics have long realized that what consumers demand when they purchase medical services are not these services

per se but rather better health. Indeed, as early as 1789, Bentham included relief of pain as one of fifteen “simple pleasures” which exhausted the list of basic arguments in one’s utility function (Bentham 1931). The distinction between health as an output or an object of choice and medical care as an input had not, however, been exploited in the theoretical and empirical literature prior to 1972.

Grossman’s approach to the demand for health has been labeled as the human capital model in much of the literature on health economics because it draws heavily on human capital theory (Becker 1964, 1967, 1993; Ben-Porath 1967; Mincer 1974). According to human capital theory, increases in a person’s stock of knowledge or human capital raise his productivity in the market sector of the economy, where he produces money earnings, and in the nonmarket or household sector, where he produces commodities that enter his utility function. To realize potential gains in productivity, individuals have an incentive to invest in formal schooling and on-the-job training. The costs of these investments include direct outlays on market goods and the opportunity cost of the time that must be withdrawn from competing uses. This framework was used by Becker (1967, 1993) and by Ben-Porath (1967) to develop models that determine the optimal quantity of investment in human capital at any age. In addition, these models show how the optimal quantity varies over the life-cycle of an individual and among individuals of the same age.

Although Mushkin (1962), Becker (1964), and Fuchs (1966) had pointed out that health capital is one component of the stock of human capital, Grossman was the first person to construct a model of the demand for health capital itself. If increases in the stock of health simply increased wage rates, this undertaking would not have been necessary, for one could simply have applied Becker’s and Ben-Porath’s models to study the decision to invest in health. Grossman argued, however, that health capital differs from other forms of human capital. In particular, he argued that a person’s stock of knowledge affects his market and nonmarket productivity, while his stock of health determines the total amount of time he can spend producing money earnings and commodities.

Grossman’s approach uses the household production function model of consumer behavior (Becker 1965; Lancaster 1966) to account for the gap between health as an output and medical care as one of many inputs into its production. As pointed out above, this model draws a sharp distinction between fundamental objects of choice—called commodities—that enter the utility function and market goods and services. These commodities are Bentham’s (1931) pleasures that exhaust the basic arguments in the utility function. Consumers produce commodities with inputs of market goods and services and their own time. For example, they use sporting equipment and their own time to produce recreation, traveling time and transportation services to produce visits, and part of their Sundays and church services to produce “peace of mind.” The concept of a household production function is perfectly analogous to a firm production function. Each relates a specific output or a vector of outputs to a set of inputs. Since goods and services are inputs into the production of commodities, the demand for these goods and services is a derived demand for a factor of production. That is, the demand for medical care and other health inputs is derived from the basic demand for health.

There is an important link between the household production theory of consumer behavior and the theory of investment in human capital. Consumers as investors in their human capital produce these investments with inputs of their own time, books, teachers' services, and computers. Thus, some of the outputs of household production directly enter the utility function, while other outputs determine earnings or wealth in a life-cycle context. Health, on the other hand, does both.

In this model, health—defined broadly to include longevity and illness-free days in a given year—is both demanded and produced by consumers. Health is a choice variable because it is a source of utility (satisfaction) and because it determines income or wealth levels. That is, health is demanded by consumers for two reasons. As a consumption commodity, it directly enters their preference functions, or, put differently, sick days are a source of disutility. As an investment commodity, it determines the total amount of time available for market and nonmarket activities. In other words, an increase in the stock of health reduces the amount of time lost from these activities, and the monetary value of this reduction is an index of the return to an investment in health.

The five papers in this issue of *REH* draw on the above framework and extensions of it in a variety of different ways. All of them are linked, however, by an emphasis on the role of time in the production of two aspects of health: obesity (a negative health outcome) and the general health of elderly persons.

Angela Fertig, Gerhard Glomm, and Rusty Tchernis and Chung-Ping Albert Loh focus on obesity. This focus is important because in the United States and most other developed countries, the percentage of adults who are obese has doubled since the late 1970s, and tripled among children (Rashad and Grossman 2004). In the US, obesity accounts for between 100,000 and 300,000 premature deaths a year and for almost 10% of aggregate medical care expenditures (Chou et al. 2005).

Genetic factors cannot account for the rapid increase in obesity since the late 1970s—these factors change very slowly over long periods of time. Therefore, economists can play an important role in examining the determinants of this trend. One important change that has had an impact on many aspects of the family is the increase in employment among mothers. Anderson et al. (2003) find that the rise in average hours worked by mothers can account for as much as one-third of the growth in obesity among children in certain families. In part, the rise in obesity may have been an unintended consequence of encouraging women to become more active in the workforce.

Fertig, Glomm, and Tchernis probe the mechanisms behind this effect in the context of a model in which parents demand healthy children and produce them with inputs of time at home, mainly that of the mother, and market goods. They are able to do this by combining data on children's time use over a 2-day period, the number of meals eaten over that period, and the percentage of meals eaten in a restaurant with information on the child's obesity status (reflected by body mass index—weight in kilograms divided by height in meters squared) and mother's hours of work. They are particularly interested in uncovering mechanisms that can account for the larger effect of mother's hours of work on the body weight of their children for more educated women (see the studies that they cite).

Fertig, Glomm, and Tchernis find that an increase in the number of meals eaten lowers body mass index (BMI), possibly because the probability of eating breakfast rises. They also find that an increase in the fraction of time spent watching television raises BMI, while an increase in the fraction of time spent reading or listening to music lowers it. In turn, children of mothers who work more hours eat fewer meals, allocate a larger amount of time to watching television and a smaller amount of time to reading or listening to music. Hence, nutrition and maternal supervision appear to play roles in the relationship between maternal hours of work and childhood obesity, although the magnitudes of the effects are modest. Finally, although the maternal hours effect is bigger for the children of more educated mothers, the authors fail to uncover significant differences in mechanisms by education. The study provides a good deal of “fuel” for future research and highlights the complex nature of the factors at work in the obesity epidemic.

Chung-Ping A. Loh shifts the focus from children’s weight outcomes to those of older US workers between the ages of 51 and 61. He does not deal with obesity as an outcome per se. Instead, he examines the determinants of a key input into its production: exercise. In turn, this activity depends on the amount of time allocated to it and market goods. A pure consumption version of Grossman’s demand for health model suggests that an increase in the wage rate will raise the relative price of exercise if, as is likely, it is a time-intensive activity. The resulting substitution effect will lead to less exercise. But there also is an income effect, which should increase the optimal amount of exercise.

Loh argues convincingly that the above approach is too simple because it assumes that all workers can freely choose their number of hours. Thus, he takes account of hours constraints in the estimation of labor supply and exercise demand functions that emerge from a Stone-Geary utility function. Using sophisticated maximum likelihood techniques, he finds that the relaxation of hours constraints would increase exercise by those who work more than their desired number of hours, while it would lower exercise by those who work less than the desired number of hours. While these results are not surprising, his finding that on balance exercise would rise is intriguing. He also reports that the imposition of the current French labor law of a maximum work week of 35 h would lead to an increase in exercise.

Loh’s results are intriguing, but they are somewhat limited because they pertain to older male workers. Moreover, they employ a limited measure of exercise: a dichotomous variable that equals one if the respondent engaged in light or heavy exercise three or more times a week. In addition, his theoretical model assumes that exercise is produced by time alone. While this is approximately correct for some forms of exercise, it is not correct for others. So it seems as if more research is called for in this important area. An examination of the exercise decisions of workers who are just starting their careers or who are at the peak of this activity would be rewarding because decisions made early in life can have crucial impacts on later health outcomes.

The last several decades have witnessed dramatic increases in longevity and in the number of elderly persons in most of the developed world and in many developing countries as well. The production of health in this segment of the

population often draws on time inputs supplied by spouses and adult children. The last three papers are unified by alternative theoretical and empirical treatments of this phenomenon and are conveniently considered as a set.

Kerry Anne McGeary considers the impact of a health shock by one spouse on the retirement decision of the other spouse in a panel of individuals who were between the ages of 51 and 75. She expands Grossman's pure consumption model by including the health of each spouse in a family utility function. In her model, a health shock to one spouse has both an income and a substitution effect for the retirement decision of the other spouse. If, for example, the shock forces the wife to retire, family income declines. This income effect will cause the husband to delay retirement. On the other hand, the husband's marginal product in the production of his wife's health may rise, and the resulting substitution effect may induce him to retire. Similar forces are at work when the husband experiences a health shock. McGeary provides the additional insight that, to the extent that couples are forward-looking, their current consumption, work, and savings decisions will take account of future health shocks. When the shock occurs, only the substitution effect may be at work.

McGeary finds that a health deterioration experienced by one spouse does affect the retirement of the other spouse, but the impacts are not uniform. Wives are more likely to retire if their husbands develop heart disease, but the converse does not hold for husbands. On the other hand, one spouse is more likely to retire if the other one experiences a decline in an index of the number of activities of daily living that an individual has difficulty performing.

Emmanuel Mentzakis, Paul McNamee, and Mandy Ryan expand McGeary's treatment of informal care provided inside the household (co-residential care) by considering explicit measures of whether this type of care is provided and if so the number of hours a week supplied. Moreover, they do not limit the caregiver to a spouse. Instead, it could be an adult child caring for his or her elderly parent as well as one spouse or partner caring for the other spouse or partner. Finally, they include more covariates than McGeary.

Mentzakis, McNamee, and Ryan find that co-residential care competes with other uses of time such as childcare and employment. Wealthier individuals are less likely to be caregivers, while wealthier households are more likely to contain a caregiver. Clearly, the former finding reflects a substitution effect, while the latter reflects an income effect. When hours of caregiving supplied is the outcome, only a substitution effect is observed and then only when the caregiver is a female. Finally, they report evidence of both substitution and complementarity between informal care and such formal care measures as the use of a social worker or a home health aid. One problem here is that formal care is a potential endogenous regressor. While the exogeneity assumption may be correct for British data examined in the paper, it may not apply to the US.

Lilliana E. Pezzin, Robert Pollak, and Barbara Schone enrich the theoretical framework for studying the production of elderly health and the supply of informal care to that activity by allowing adult children to affect the care that an elderly parent provides to his or her disabled spouse. In their model, demonstration and punishment mechanisms provide incentives for one elderly parent to supply time to

the production of the health of a disabled spouse. The demonstration effect is one of learning by adult children that family caregiving is appropriate behavior. Thus, a wife who currently is providing care to her husband can expect to receive care from her children if she becomes disabled in the future. The punishment effect is one in which her children will refuse to provide future care for her if she does not provide care for her husband in the present. These incentives are greater if the elderly couple has joint children (children who were acquired by both parents at the same time through birth or adoption) than if the father, for example, is a stepparent.

They find empirical support for this behavior, although hours of spousal care when there are joint children are not higher than when there are stepchildren who have a high attachment to the disabled spouse (at least one of the stepchildren have lived with the stepparent for at least 9 of the child's first 18 years of life). But spousal hours of care are much greater in both cases relative to one in which there are no children or in which there are stepchildren with low attachment to the nondisabled parent. These findings control for a variety of demographic and health characteristics of the disabled parent.

Taken together, the three papers provide a very rich point of departure for future research on the production of elderly health and the demand for caregiver's time. They highlight the necessity to make theoretical modifications to conventional demand for health models. They also highlight the requirement to consider a variety of outcomes: the decision to retire, the decision to provide care, and how much care to provide.

In conclusion, we hope to have convinced the reader that the economics of the household has everything to do with health economics, especially with that part of the field that pays serious attention to the distinction between health as an output and medical care as only one of many inputs into its production. The five papers in this issue cover only two of many current topics that are attracting the attention of health economists who do not focus on the determinants of the cost of medical care. Other topics include the economics of substance use, the causal nature of the relationships between health and schooling and between health and income, health and the business cycle, and determinants of infant health outcomes. Papers on some of these topics have appeared in past issues of *REH*, and future issues will be characterized in a similar manner.

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